Third United Nations International Conference on the Peaceful Uses of Atomic Energy

A/CONF.28/A/766
UKRAINIAN SSR
February 1964
Original: RUSSIAN

Confidential until official release during Conference

Abstract

DETERMINATION OF INTENSITY OF THE RADIOACTIVE CONTAMINATION IN THE OCEAN BASED ON THE NEW EXCHANGE DATA

V.I. Belyaev, A.G. Kolesnikov and B.A. Nelepo
Marine Hydrophysical Institute of the A.S. UkSSR, Sevastopol

Till now the term "age" was used to determine spreading rate of the radioactive contamination in the ocean. Numerous authors considered "the age" of the Atlantic Ocean to be 500 years. However, one cannot mechanically transfer the term "age" from other sciences to the ocean. The obtained values will not be reliable because of the complication of observed processes. This often leads to the incorrect conclusion of the low exchange intensity in the ocean and consequently to underestimation of contamination danger of the vast ocean areas caused by radioactive wastes.

Later some investigators used diffusion coefficient values derived from the experimental data. And though calculations of the contamination spreading rate were of great interest they gave us only general ideas about the process above-mentioned. This can be explained by the fact that up to this time the simplified mathematical concepts and models were used (not considering some peculiarities such as the vertical component of the average current velocities and real law of the radioactive fall-out on the ocean surface).

The paper includes the results of spreading rate calculations of the radionuclides with various half-lives (based on numerical solution by computers) of the complete equation of turbulent diffusion. This involves the really observed value of fall-out on the surface from the beginning of the first tests. Turbulent diffusion coefficients and vertical components of the average current velocities were calculated from the data collected aboard r/v "Mikhail Lomonosov" in the Atlantic Ocean.

Translation provided by courtesy of the submitting Government

Obtained solutions of the radionuclide concentration and the radioactivity at various depths in the Atlantic Ocean were analysed.

The following conclusion was drawn:

(1) Depth of penetration of the radioactive isotopes increases with the increase of the radioactive isotopes half-life.

(2) The mode of distribution of the radioactive elements generally repeats distribution of density, indicating the importance of thermocline.

(3) Calculated curves for Sr^{90} and Cs^{137} distribution with depth are in complete agreement with the observed data.

(4) Analysis of the obtained solutions leads to much higher spreading rate of the radioactive contamination than existing knowledge. The latter is in good agreement with the observation data of Sr^{90} concentration distribution with depth carried out by r/v "Mikhail Lomonosov".